

Braking in an Automobile Using Pressure Sensors in Steering wheel

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Abstract:

In recent years the rate of accidents annually is increasing dramatically in which a major part consists of lack of reflex before the actual collision. The key goal was to develop an emergency braking system which will work on the basis of driver’s reflexes. In this concern I present you an emergency pressure sensing braking system in automobiles the pressure sensing steering wheel will apply the brakes on the scale of driver's wrist pressure which is applied to the steering wheel before collision. The proposed design will work in any automobile consisting a steering wheel. This system mainly consists of pressure sensors located in steering wheel; control unit connected to braking system. The control unit can be configured or programmed to determine if at least one of the driver's hands is pressing upon a region of the steering wheel for a predetermined amount of time.

Keywords —Pressure sensor, steering wheel, braking system.

I. INTRODUCTION

The invention relates to a vehicle safety system includes a steering wheel, a plurality of pressure sensitive sensors located in the steering wheel, and a control unit. The pressure sensitive sensors can be located in different regions of the steering wheel in a ring formation. The pressure sensitive sensors can determine if a driver's hand is pressing upon a respective region of the steering wheel associated with one or more of the pluralities of pressure sensitive sensors. The control unit can be configured or programmed to determine if at least one of the driver's hands is pressing upon a region of the steering wheel for a predetermined amount of time. The main feature of this project includes:

- SAFETY OF PASSENGERS
- EASY APPLICATION
- DECREASES THE CHANCES OF ACCIDENTS

- STEERING CUM BRAKING SYSTEM

II. LITERATURE

- The present invention relates generally to the field of steering wheels. More specifically, it relates to a system for sensing the presence of a driver's hands on the steering wheel.
- Conventional steering wheels do not have the capability of detecting the drivers hand position during vehicle operation. In normal driving conditions both hands should be present on the steering wheel to be in full, safe control of the vehicle, following the “hands on the wheel, eyes on the road, mind on the drive” safety mantra.

- In recent times, the number of potential distractions for a driver has increased. With the advent of portable electronics (e.g., mobile phones, mp3 players, etc.), there are a number of electronic distractions that encourage or tempt drivers to take their hands off the steering wheel. For example, such portable electronics can require manually dialing or selecting a phone number in order to make a cell phone call, or manually texting messages and/or answering emails, or selecting which song to play on an attached MP3 player.
- It would be desirable to provide a system for identifying the presence and/or location of a driver's hands on the steering wheel to allow for vehicle based warnings and inputs for other vehicle and steering wheel based systems.

III. SUMMARY

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IV. PURPOSE DESIGN AND DEVELOPMENT

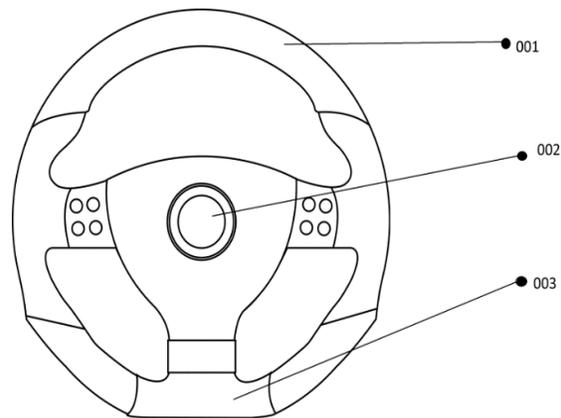


FIG. 1

[001] Upper Part of Steering Wheel leather stitched cushioned foam underlying sensor plate which can be shown in FIG.2

[002] Center (Horn) usually comprises of airbags and horn and steering joint attached to steering column

[003] Bottom Part of Steering Wheel components similar to (001)

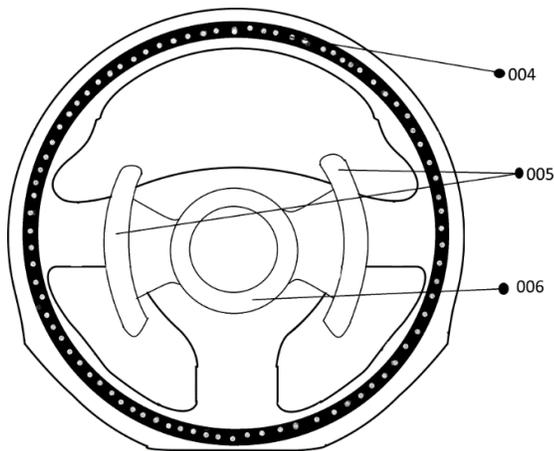


FIG. 2

- [004] Pressure Sensor in ring formation imbedded inside the cushioned steering wheel
- [005] PADDLE SHIFTER used for shifting between the gears
- [006] Steering Mounts for connection between steering shaft and the steering wheel

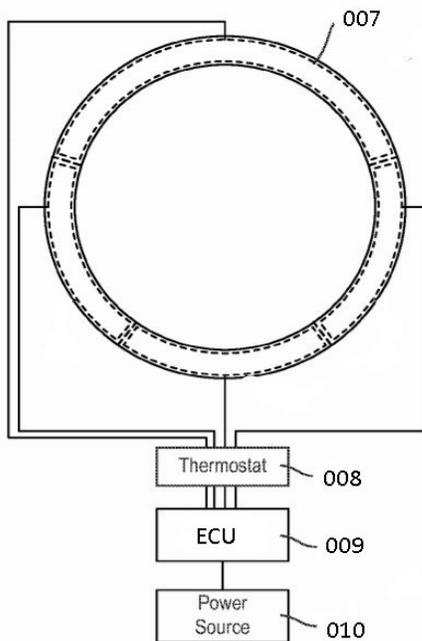


FIG. 3

[007] **Pressure Sensing Ring** in which all the sensors are placed in uniform arrangement for better precision pressure mapping systems measure interface pressure between two surfaces, utilizing a thin and flexible sensor ring and palm grip.

[008] **Thermostat** which can sense the warmth of human contact for further actuation. Separate heating loops within the heating element design can be provided for each sensing Zone of a steering wheel. Such as four Zones of a steering wheel, as described above. All of the separate loops can pass within a heating thermostat temperature reading Zone such that the temperature could be controlled by the electronic or bi-metallic heat in controller. An electronic control unit or circuit can determine, based on input of whether the heated wheel was turned on and based on where the hands of a driver are located, how to prioritize electrical current to the various Zones or heating loops. Such as by giving higher priority to the Zones which are contacted by the driver's hands. By prioritizing the heated areas or only heated those areas or Zones being contacted, the amount of heat able area can be reduced and a faster heat up curve or response can be achieved by channeling the same total current into a smaller heater circuit, thus improving the heat up rate of the steering wheel in those Zones where the hands of a driver are located.

[009] **ECU (Electronic control unit)** will pass the data acquired by the sensors to the mechanical actuators an electronic control unit (ECU) is an [embedded system](#) in [automotive electronics](#) that controls one or more of the [electrical systems](#) or subsystems in a vehicle.

[010] **Power Source** will supply power to whole circuitry the power management controls the power given to the ECU

manufactured by forming a thin metal sheet into a ripple shape.

V. STRUCTURAL CONSTRUCTION

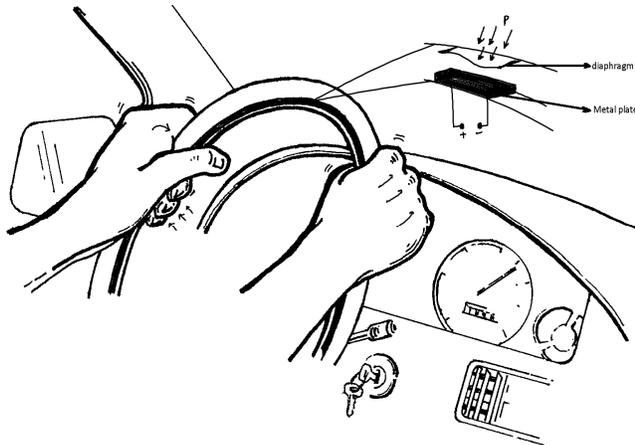


FIG. 4

- A. Capacitive Pressure Sensor-** as shown in FIG. 4 it comprises of a metal plate and a diaphragm which is connected to the circuitry this will provide evident feedback from the applied wrist pressure and its amount
- **Microcontroller-** Will work as the controlling unit as it comprises of one or more CPUs (processor cores) along with memory and programmable input/output peripherals

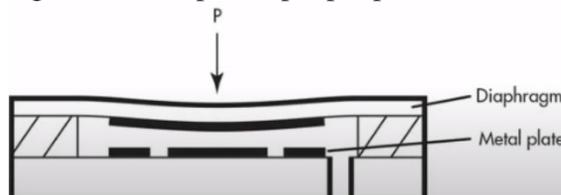


FIG. 5

- **Pressure Sensor**
 Metal plate-It is rigid plate fixed at one end.
 Diaphragm-Metal diaphragms are thin circular plates that undergo elastic deformation when subjected to pressure or axial loading. They are typically

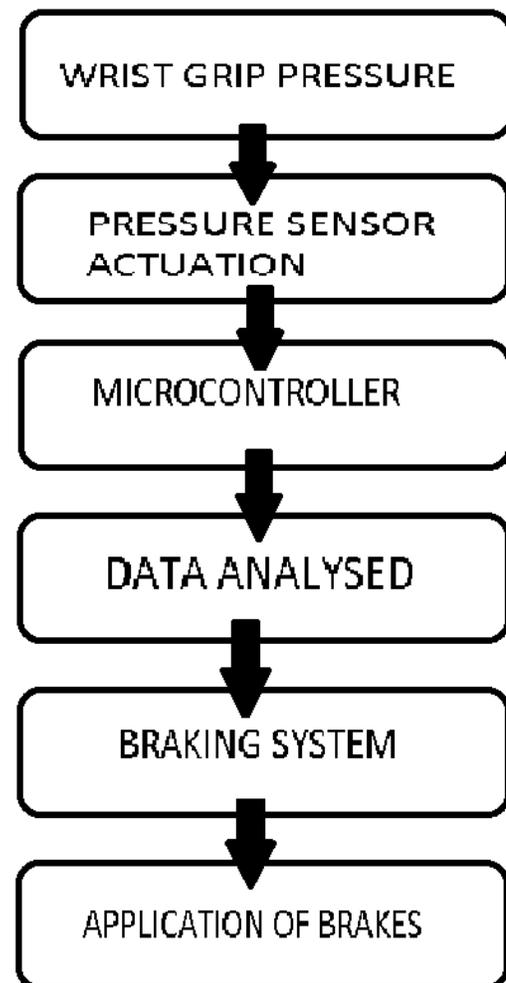
B. FORMULA USED FOR PRESSURE SENSITIVE

Sensitivity,

$$= \frac{(\text{pressure at maximum cap value}) - (\text{pressure at minimum cap value})}{(\text{maximum cap value}) - (\text{minimum cap value})}$$

$$= \frac{\text{pressure (psi/pa)}}{\text{cap (farad, f)}}$$

C. BLOCK DIAGRAM



VI. FUTURE SCOPE

The rate of accidents due to late reflexes per year would decrease as in such situations driver is able to stop the vehicle with his before collision reflexes. This will help in saving many lives and at the end life is what matters the most.

VII. CONCLUSION

Steering mount pressure sensing, and braking system is still in infant stage and many challenges have been rectified. The gradual progress in these areas will definitely increase the efficiency of the system and safety of the passengers. This can be applied to various types of vehicle as a part of their safety system.

REFERENCES

- [1]. Steering wheel with hand pressure sensing system Fig. 3 by [Jason Lisseman](#), [David Andrews](#), [Jerome BOSCH](#), <https://patents.google.com/patent/US20110246028A1/en>
- [2]. Capacitive pressure sensing by Dan K Chen <https://www.youtube.com/watch?v=O9RWR6Qi82>
- [3]. Pressure Sensor fig. 4 https://www.danmacleod.com/ErgoForYou/10_principles_of_ergonomics.htm
- [4]. Fig. 5 <https://www.semanticscholar.org/paper/Ferrofluid-Sacrificial-Microfabrication-of-Pressure-Assadsangabi-Chen/fbc2c52edfbbbee4f8e138ba8848af47be9ebec>